THE

VETERINARY JOURNAL

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OCTOBER, 1938

Frontispiece

PROF. DR. E. LECLAINCHE

President of the Permanent Committee of the International Congress of Veterinary Medicine

PROFESSOR LECLAINCHE is one of the most distinguished personalities of our profession. Formerly Chief of the French veterinary services, honorary Director to the Minister of Agriculture, President of the International Office of Epizootics, he is also President of the Academy of Sciences in Paris. It is the first time that this post, the highest that French science can offer to its most eminent members, has been occupied by a member of the veterinary profession.

The members of the British veterinary profession (and may we state also, those of all other countries) will rejoice in the honour conferred on this great Frenchman.

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Editorial

THE REPORT OF THE COMMITTEE ON VETERINARY EDUCATION IN GREAT BRITAIN

We draw the attention of our readers to an authoritative summary which has been made in a further column on the Report of the Committee on Veterinary Education in Great Britain. This Committee was originally appointed on November 3, 1936, and its findings have been awaited with considerable eagerness on the part of the members of the profession, and our readers in particular, for some considerable time. These findings were promulgated in a White Paper which was issued on September 27, and we advise our readers to obtain a complete copy (2s. net) from His Majesty's Stationery Office, and study it carefully, not only from the point of view of the profession, but from the particular branch in which each one has specialised. There is much of interest and vital importance for everyone, and although we may not all see eye to eye with every detail of the findings there are two points which stand out with great prominence, the first being that it is openly stated (on page 8) that "Veterinary education has in the past been starved, and if leeway is to be made good and defects are to be remedied considerable expenditure, capital and recurring, must be faced." This point has been hammered into the Government Authorities on every possible occasion for many years; and also that in the Schools "The teaching staffs are inadequate and in many instances the stipends are low and out of all proportion to the responsibilities that the posts carry" and "teachers have neither the time nor facilities for research." There is a little silver lining, however, to the cloud in that a compliment is paid not only to the teachers and the members of the profession, but also to the students themselves, in the statement that "This is a formidable indictment, but we do not believe it to be overdrawn, and it might be supposed that with conditions of training so defective, the quality of the veterinary profession in this country must necessarily be inferior. That this is not so is attributed alike to the Royal College of Veterinary Surgeons, to the teachers, and to the students themselves."

The Committee visited each of the four Veterinary Schools in Great Britain, and made an instructive tour of the Colleges of Utrecht, Hanover, Berlin, Zurich, Berne and Paris, all of which are old Schools, more or less in process of being modernised, and it would have been a further education had they also visited the modern Colleges of Leipzig and Oslo which are instances

of what was so recently done in the case of the London College; i.e., the whole of the buildings were new and were designed to bring them into line with modern architecture and equipment. One point stands out a little prominently in connection with the London College where it is stated that the "Royal Veterinary College, lately rebuilt in Camden Town, lacks effective contact with the related sciences, and is remote from farms. The decision to rebuild the College on its old site was, in our opinion, mistaken and portends increasing embarrassment over a long future." An attribute is, however, paid to those who had to do with the designing and construction in that the Report admits that "the buildings are well designed and constructed." That the College "lacks effective contact with the related sciences" is certainly not because the institutions of the "related sciences" are not close at hand; for where can one find better facilities for bringing the students in direct contact with the work which is being done by the "related sciences" than London? As to its being "remote from farms," there is no part of London which is more easily accessible for the transport of students and for the transport of farm animals than Camden Town. It is within a comparatively few minutes by motor ambulance of every principal terminus in London and to stock owners and owners of racing studs who have their own transport the matter is easier still. Besides which it has only been the financial aspect of the question which has kept the College from having its own ambulances. In regard to "its being remote from farms," here again motor transport will always take the students to visit outside farms and establishments whose owners are only too willing to oblige. Besides which it is well known that it was the intention of the Governors not only to build accommodation for 50 large animals within the College (and this was to include not only horses but cattle, etc.), but the College plans included a Field Station within easy range, and several such places had already been inspected and sums of money promised towards the purchase of whatever was found suitable. Every Veterinary School without exception on the Continent, except Leipzig (the authorities of which already regret this error), is built in or near a large town, and of those such as Zürich and Berne, which are contemplating new buildings, the authorities responsible for the plans say definitely that it would be a mistake to get far away from the city. Facilities for the owners of animals to bring them to the clinic or for them to be conveyed to the College by ambulance is of the greatest importance. Even in India the same applies for there is only one College which is built in the country and although in an agricultural neighbourhood, it is as near as possible to the capital city of the province.

The Report is most thorough and it speaks volumes for the veterinary members of the Committee (and it seems a curious anomaly that there was only one in the first section) that their colleagues gained such a good idea of the great need for help (particularly financially) of Veterinary Science. When one thinks that "the estimated value of the output of livestock and livestock

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products in the United Kingdom in 1936 and 1937 was £191,000,000," it is astonishing that the scientific man, upon whom depends the protection against epidemics—and this can only allude to the Veterinary Surgeon—should have been so neglected in the past in regard to the opportunities afforded him by the Ministry of Agriculture and the Ministry of Health for putting into practice the knowledge which his lifelong experience as a Veterinary Surgeon has taught him. Again one reads that "in England and Wales the loss due to the increased cost, owing to disease, of maintaining herds of cattle at full strength is £2,300,000; the loss of meat condemned on account of disease is £300,000, and the loss of calves from abortion is £200,000. The annual loss of poultry alone from disease has been estimated by the National Veterinary Medical Association £4,000,000." The steps which have been taken in the past have been hopelessly inadequate; even the meat we eat is only inspected in a few of the more enlightened parts of England by the man who is acquainted with the diseases of the animal from which it comes, i.e., the Veterinary Surgeon. It is hoped that the recommendations which are put forward for the proper utilisation and financial support of Veterinary Science as recommended by this Committee, though they may appear revolutionary, will be put into action with the least possible delay. "In all a capital expenditure of £299,000 is involved and recurring grants rising to £61,350." This includes all animals and animal husbandry, field stations at London, Liverpool and Glasgow, which the profession will be pleased to note the Committee regard "as a vital need." "The necessary addition to School buildings at Edinburgh accounts for £36,000 and the new University buildings at Glasgow will cost £40,000. Finally to replace the unsuitable University building at Liverpool by a properly designed School, £100,000 will be required." It is again of interest to read that "judging by Continental standards, the proposed grants may seem illiberal," but we consider that they will be sufficient for the purpose. On a basis of 800 students the cost per student to the State would amount to £75 annually; this compares with £300 in Holland, £331 in Norway, £116 in Sweden, and £70 in France. To the "one-portal" system the Committee only allot a brief chapter of one page, the verdict being that "we are not of the opinion that a multi-portal system of entry into the profession will be to its advantage," and it very rightly considers the value of a scheme they have recommended "which embodies some reconstitution of the R.C.V.S., reorganisation of its relations with the Schools and a number of the Universities, eliminates many of the disadvantages associated with the present system, whilst retaining its uni-portal character; and it is designed to secure the increased breadth of vision and training that we desire."

Farm pupilage, animal husbandry and clinical training are strongly emphasised and in this every member of the profession is at one with the Committee, for it has been the cry of the country practitioner for many years that the pupils sent to him by the Schools have no knowledge, in the majority

of instances, of farm animals, or farm life. For years immediate and well-paid employment has been awaiting the new graduate either in towns, the colonies, the army or some post where his salary is not only assured but considerably more than the practitioner can afford to pay for an assistant, and this is to blame for the anomalous state of affairs in a profession whose main source of income has gradually switched off from the horse to the smaller animals in the town and the cattle (particularly the dairying variety) in the country; for at last we are now in line with other countries and have a Government Veterinary State Service. There is much more that might be abstracted, but one hopes that every Veterinary Surgeon without exception, in whatever branch he may be earning his livelihood, will spend 2s. in purchasing this well-thought-out and interesting Government Report upon the financial and educational side of a profession whose help is so essential to the prosperity of an agricultural industry, the estimated value of whose output of livestock and livestock products in 1936-37 was no less a sum than £191,000,000.

General Articles

SUMMARY OF THE REPORT OF THE COMMITTEE ON VETERINARY EDUCATION IN GREAT BRITAIN*

Presented to Lt.-Col. the Rt. Hon. John Colville, J.P., M.P., Secretary of State for Scotland; and the Rt. Hon. W. S. Morrison, M.C., K.C., M.P., Minister of Agriculture and Fisheries

THE constitution of the Committee at the time of its original appointment was as follows:

Members

The Rt. Hon. Sir Thomas Molony, Bt., M.A., LL.D., K.C. (Chairman)
Sir James Currie, K.C.M.G., K.B.E., J.P.
Thomas Loveday, Esq., M.A., LL.D.
Sir John Robertson, C.M.G., O.B.E., M.D., LL.D.
John Smith, Esq., O.B.E., M.R.C.V.S., D.V.H.

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*Under the Authority of the Ministry of Agriculture and Fisheries, and Department of Agriculture for Scotland. Published by His Majesty's Stationery Office. Price 2s. net.

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Joint Secretaries

V. E. Wilkins, M.B.E. (Ministry of Agriculture and Fisheries)
W. N. McWilliam (Department of Agriculture for Scotland)

Owing to the lamentable deaths of Sir John Robertson and Sir James Currie, and to Sir Thomas Molony's resignation, the Committee was reconstituted as follows:

Members

Thomas Loveday, Esq., M.A., LL.D. (Chairman)
Sir Joseph Barcroft, C.B.E., M.A., F.R.S.
W. L. Burgess, Esq., M.D., F.R.C.P.E., D.P.H.
Sir Louis J. Kershaw, K.C.S.J., C.J.E.
John Smith, Esq., O.B.E., M.R.C.V.S., D.V.H.
W. R. Wooldridge, Esq., M.Sc., Ph.D., M.R.C.V.S.

Joint Secretaries

W. R. Black, M.B.E. (Ministry of Agriculture and Fisheries)
W. N. McWilliam (Department of Agriculture for Scotland)

As a result of staff changes at the Ministry of Agriculture, Mr. V. E. Wilkins was replaced by Mr. W. R. Black as one of the Joint Secretaries on August 27, 1937.

The Committee visited the four Veterinary Colleges in Great Britain, also twice at Cambridge; selecting Utrecht, Hanover, Berlin, Zürich, Berne and Paris (Alfort) as types of the continental schools for consideration.

The Committee met in all on 74 days and took evidence from a large number of witnesses, a list of whom is given in Appendix 1 of the Report—which occupies some 124 pages.

The Report, consisting of twenty chapters and ten appendices, includes a detailed review of the national importance of the veterinarian, the qualities required to ensure success in the profession, and the probable demands for qualified men in the future. It then goes on to describe the functions of the R.C.V.S., its connections with the schools and the relation between schools and universities. The questions of animal husbandry, clinical training, the present curriculum and mode of examination are next discussed, and then some observations upon the present schools and what is required to bring them up to present-day standards. An important inclusion is a note on the one portal system of entry into the profession. Short and inadequate as is this summary of the subjects dealt with, it will serve to demonstrate how thoroughly the Committee have investigated the matters into which they were asked to inquire and what a wide and long range view they have adopted. They have devoted 74 days to the inquiry and the estimated cost is £820. The cost of printing the Report, a document of 124 pages, is put at £158 10s.

A perusal of the Report makes obvious the fact that the Committee

have endeavoured to ascertain the importance of the veterinarian in the future, and the part he will be called upon to play in agricultural and national progress; and, if his importance is of significance, how he is to be fitted for the tasks which lie before him. On the first point, the answer is no uncertain one:

> The veterinary profession, then, as guardian of a vast population of livestock on our farms, safeguards a large part of the nation's wealth and is an important factor of national security.

The Committee says that the present training is unsatisfactory; the basic sciences are not adequately taught; the teaching staffs are small and badly paid; the numbers of students are excessive for the accommodation; and the staff have no time for research. Attention is focused too completely on the curative aspect and the preventive neglected; animal husbandry is not stressed and the farm animal receives too little attention relatively to that given to horse, cat and dog. In summing up this chapter, a compliment is paid to the R.C.V.S. and the schools because, in spite of existing conditions, the quality of the veterinarian in this country is good.

After reviewing the functions of the R.C.V.S., the state of the schools and their relations with universities, comments are made upon the present system under which only external examiners are appointed. This system is condemned, as is the fact that examiners have been reappointed over long periods. A review of existing schools deplores the rebuilding of that at Camden Town upon its present site, and states that the buildings allotted to the veterinary subjects at Liverpool are quite inadequate, whilst still further accommodation is required in Edinburgh. The Glasgow school, as it is now, is said to be wholly unsuitable.

Up to this stage the Report is critical in its nature, but far-reaching constructive proposals are now made. First of all, it is recommended that no change be made in the present one portal entry. Dealing with what may be described as the background of the student, the preliminary standard of matriculation, recently introduced, is welcomed but a knowledge of agricultural matters is said to be of vital importance. To obtain this a pupilage of six months upon a farm, at varying seasons of the year if possible, is recommended as compulsory before the student is admitted for the fourth year's training. A change in the present curriculum is recommended so that the first three years of training are devoted entirely to the study of the fundamental sciences. Arrangements should be made with universities for this period of study to entitle the student to a science degree, the R.C.V.S. recognising the examinations for exemption from their own. This degree *en route* is strongly advocated as, it is stated, the present arrangements for degrees necessitate additional classes and examinations and throw a heavy burden upon a student already heavily loaded with subjects. The extra cost would also be eliminated. Following this period, the Committee recommend

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that the fourth year be devoted to the study of animal husbandry, and its allied subjects, exclusively. Mention is made, in more than one place in the Report, of the importance of this subject and of the fact that veterinarians are being called upon more and more for advice on means for maintaining stock in a healthy condition. It is recommended that a field station of about 100 acres be attached to each school, and that upon it be maintained farm stock under normal conditions. The student would spend the whole of his fourth year upon this station.

The Committee were definitely concerned with the small numbers of farm animals which have been available to students in the hospitals at the schools. The claim to Government assistance in veterinary education is based upon the importance of the farm animals, and, says the Report, it is essential that adequate opportunity be given to the student for their clinical study. In order to obtain this, rural hospitals adjoining the field stations are recommended. The difficulties are recognised, but the Committee are convinced that, through the goodwill and co-operation of practitioners, such hospitals will become of real value to the school, student and veterinarian.

Such is, broadly, the education suggested. In order to make this possible, considerable financial expenditure is necessary. The Report states that, in the past, veterinary education has been starved and its importance demands more adequate financial assistance from public funds. The recommendations include a hospital and field station for each school, and total capital expenditure as follows: London, £42,000; Liverpool, £136,000; Edinburgh, £36,000; and, in connection with the Cambridge scheme, £5,600. In addition, maintenance grants will be necessary and the Committee recommend that these be given as block grants of an annual amount, during the quinquennium ending 1942, of £25,000 for London; £8,000 (together with an annual grant for the hospital and field station) for Liverpool; an amount rising to £14,000 for Edinburgh; and a deficiency grant up to £5,000 for Cambridge. The total capital expenditure envisaged in all the proposals is £299,300, with annual maintenance grants from public funds of about £62,000. The Committee, recognising that Government grants are usually given on a £ for £ basis, and approving the principle in general, state that if this condition be imposed in connection with the capital expenditure recommended, there will be indefinite delay in carrying out the building programmes. The Report states:

> The changes in the curriculum, the strengthening of the teaching staff and the capital programme constitute a balanced plan and if, through a rigid application of the pound for pound principle, suitable buildings cannot be provided, the full benefits of the improvements we recommend will be lost.

Further recommendations include the granting of a new charter to the R.C.V.S. to enable that body to allow representatives of the universities to sit upon the Council; to send observers to examinations which exempt from its own; to inspect the facilities at the schools for training in clinical subjects

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and animal husbandry; and to appoint as examiners members of the Council and teachers at the schools. It is suggested that the R.C.V.S. and the universities should meet to agree on joint action. The schools should limit the numbers of their students so as to allow of about 115 entering the profession each year after the quinquennium. During that period, the demand is estimated at 150 per annum. It is also recommended that no financial assistance from public funds be given to universities for veterinary education, except those in the cities where schools are established at present and Cambridge. The proposals envisaged will involve a cost to Government of £75 each year for each student. Comparable figures are: Holland, £300; Norway, £331; Sweden, £116; and France, £70.

One chapter of the Report is devoted to a note on unqualified practitioners. The Committee felt that to carry out a full inquiry into this question would be to go beyond the terms of reference. They recommend, however, that a special inquiry be instituted by the Government.

AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1938

Numbers of Livestock and Poultry

THE attached tables, issued from the Ministry of Agriculture, give revised preliminary figures of the numbers of livestock and poultry in England and Wales on June 4, 1938.

Livestock

	1938	1937	*Increase*		*Decrease*	
	No.	*No.*	*No.*	*%*	*No.*	*%*
Cows and heifers in milk ...	2,234,800	2,217,400	17,400	0.8	—	—
Cows in calf, but not in milk	374,600	394,400	—	—	19,800	5.0
Heifers in calf	462,100	456,100	6,000	1.3	—	—
Other cattle:						
Under one year	1,365,300	1,265,400	99,900	7.9	—	—
One year and under two	1,289,200	1,274,400	14,800	1.2	—	—
Two years and above ...	982,400	1,011,500	—	—	29,100	2.9
Total of cattle ...	6,708,400	6,619,200	89,200	1.3	—	—
Ewes kept for breeding* ...	8,527,400	7,320,500	1,206,900	16.5	—	—
Other sheep:						
One year and above ...	1,528,100	1,486,700	41,400	2.8	—	—
Under one year	7,845,200	8,387,000	—	—	541,800	6.5
Total of sheep ...	17,900,700	17,194,200	706,500	4.1	—	—
Sows kept for breeding ...	433,200	455,400	—	—	22,200	4.9
Other pigs:						
Over two months	2,243,700	2,140,500	103,200	4.8	—	—
Under two months ...	884,200	1,039,100	—	—	154,900	14.9
Total of pigs ...	3,561,100	3,635,000	—	—	73,900	2.0

(Table continued overleaf)

* Includes 1,510,300 two-tooth ewes in 1938 not separately distinguished in 1937, some of which were included last year among "other sheep."

LIVESTOCK.—*Continued*

	1938 *No.*	1937 *No.*	*Increase* *No.*	*%*	*Decrease* *No.*	*%*
Horses used for agricultural purposes (including mares for breeding)	561,600	554,800	6,800	1.2	—	—
Unbroken horses (including stallions):						
One year and above ...	107,100	101,000	6,100	6.0	—	—
Under one year	52,800	53,700	—	—	900	1.7
Other horses	134,100	149,200	—	—	15,100	10.1
Total of horses ...	855,600	858,700	—	—	3,100	0.4

Poultry

	1938 *No. Thous.*	1937 *No. Thous.*	*Increase* *No. Thous.*	*%*	*Decrease* *No. Thous.*	*%*
Fowls:						
Over six months old ...	22,912	24,377	—	—	1,465	6.0
Under six months old ...	29,527	28,256	1,271	4.5	—	—
Total	52,439	52,633	—	—	194	0.4
Ducks	2,334	2,285	49	2.1	—	—
Geese	607	553	54	9.8	—	—
Turkeys	788	680	108	15.9	—	—

STUDIES ON THE SO-CALLED ELECTRICAL STUNNING OF ANIMALS

Effect of the Intermittent Constant Current

By J. ROOS and S. KOOPMANS

From the Laboratory of Veterinary Physiology, University, Utrecht.
Director: Prof. Dr. J. Roos

In the years 1902-1906 the French physicist *Leduc* brought animals (dogs, rabbits and goats) into a condition which he called electrical sleep and which was described by him as a state of inhibition, by means of an intermittent constant current, which was sent through a part of the central nervous system. *Leduc* described the effect on the animals as follows. The animal fell on its side in a rigid state. Respiratory movements were stopped as the result of

general muscle contraction. After 10 seconds these muscle spasms vanished and five seconds afterwards respiratory movements started again and a condition was produced which could be continued for an unlimited time. When the current was switched off the animal awoke immediately, looking quietly around without exhibiting symptoms of pain, fear or fatigue.

The physical properties, to which the current had to satisfy, have been described accurately. The current had a low tension, the number of interruptions was 85-90 per sec., whilst a distinct relation of 1 : 9 had to be maintained between the time that the current passed and the period of interruption. One of the electrodes was placed on the head; the other, which was much larger and measured 8 x 10 cm., was placed on the skin somewhere symmetrically with respect to the middle line.

The hairs had to be cut short and with care. If they had been cut too long the experiment did not succeed in consequence of the higher resistance by which a higher tension was required to produce a current with the strength aimed at.

Afterwards *Leduc* submitted himself to the current. He and his fellow-workers who, according to *Leduc's* opinion, did not continue the experiment far enough, describe among others the following signs. Slight muscle contractions in face, neck and forearms. One feels pin-pricks in the tops of fingers, in hands and in feet. The centre of speech is inhibited first. Afterwards inhibition of other motor centres becomes complete. The person under experiment feels himself dozing off and is unable to react to stimulations, even though he feels them as being most painful. He cannot communicate with the persons around him.

It cannot surprise that physiologists who repeated the experiments came to other conclusions and peculiarly that they did not indicate the signs as symptoms of sleep. In an earlier paper (1934) we pointed out that the symptoms observed by *Leduc* cannot be considered as the results of sleep or narcosis or a narcosislike condition, since normal mental processes could be performed whilst motoric reactions were abolished. *Zimmern,* who had attended the experiments in *Leduc's* laboratory, repeated them in collaboration with *Dimier* (1903 and 1933). The condition in which the animals were brought has been characterised by them as being not sleep or narcosis but a state of motoric inhibition. If, however, a determined intensity of the current was reached the animals came into a state which they called the soporous phase, since the animals seemed to be inhibited whilst the muscles made the impression to be flaccid. They were not flaccid really, however, and in almost every case the authors could establish muscle rigidity. They therefore considered the electrical sleep as not existing at all. The authors had followed exactly *Leduc's* method and had used the same animals in their experiments. They further describe jerking respiratory movements, ptyalism and increase of body temperature with 2° maximally. In the goat the soporous phase observed was

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interrupted by heavy movements of the head and limbs and irregular movements resembling the convulsive movements observed in an epilepticform attack in man.

Encouraged by *Leduc's* results, surgeons have tried to apply the electric method for narcosis in man. After *Tuffier* and *Jardry* had experimented on animals they applied the current in two human patients (1908). The experience has been described very succinctly. The authors tell only that the excitation by which anæsthesia was preceded seemed to be more dolorous and more dangerous than if ether or chloroform was used. The experiments were not continued. *Leclerc* (1910) also described two cases of application in man. He gave morphium or chloral hydrali before applying the current in order to avoid unpleasant sensations set up by excitation of the perifer nerves. In one of the cases the results satisfied fully; in the other, in which an old woman was concerned, the patient died. Dissection revealed arteriosclerosis which, according to the author, might have been fatal in consequence of the increased blood pressure caused by the current.

These are so far as I know the only cases of application for surgical purpose in man, described in literature. The experience made by *Hertz* will still be discussed. Experiments on animals done with the intention to obtain an electric narcosis are more numerous. *Tuffier* and *Jardry* (1908) were the first who examined the question. They were satisfied by the results obtained in dogs. *Van Neergaard* (1923) stated after careful experiments in the dog, the cat and the rabbit that the condition evoked was quite other than the condition of narcosis and that it even could not be compared with it. In 1929 *Zimmermann,* who worked on dogs, described the results as excitation, followed by exhaustion. The so-called electrical sleep is not a real narcosis, he says, and consciousness was abolished only for a part or not at all. Recent times brought experiments by *Sack* and *Koch* (1933), *Koch* and *Sack* (1933) and *Samssonow* (1935). The latter aimed at perfection of *Leduc's* current as he had found, in accordance with the experience by *Zimmern* and *Dimier,* that slight irregularities might increase the exciting power of the current and thus might influence the results in an unfavourable way. In spite of his improvements the rabbits, caviæ and dogs could not be brought, however, into a narcosislike state. By using exactly the same current as *Leduc, Sack* and *Koch* observed a very dolorous effect on the rabbit. The animals howled and screamed repeatedly during the experiments. The seeming general anæsthesia described by *Leduc,* the authors say, is not more than inhibition of reactions on pain stimuli by the current, which in itself is very painful. Moreover, muscle spasms impede any movement, if the current varies a little. Afterwards *Koch* and *Sack* modified all properties of *Leduc's* current successively. The number of interruptions which had been 85-90 was varied in the range from 25 to 23.000 per sec. The relation between the times that the current was interrupted and was allowed to pass was changed between wide borders,

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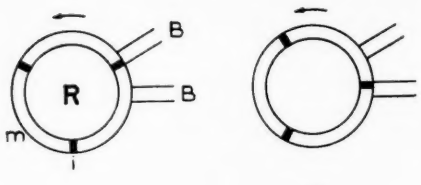
Fig. 1



I II

Fig. 1.—Scheme of rotator and brushes.
R = rotator; B = brush; m = metal; i = insulation between the metal strips. From position I to II the current passes, from II to I it is interrupted.

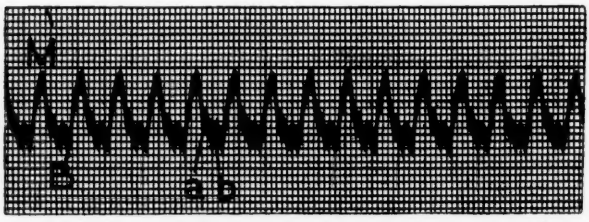


Fig. 2.—Record of the current generated.
At M and B the current is made and broken respectively.
1 scale absc. = 0.001 sec.

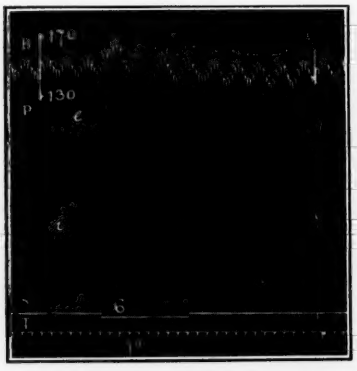


Fig. 3.—Arterial blood pressure (B) and pneumogram (P) of the cat; i = inspiration; e = expiration; T = time in sec. Slowing of respiratory movements by a current of 6 mA. The blood pressure is indicated in mm. Hg.

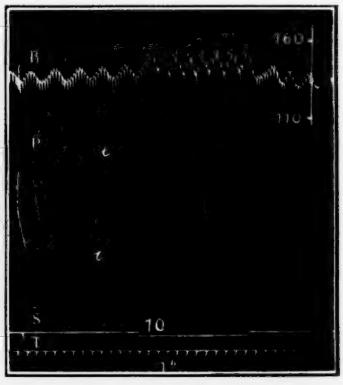


Fig. 4.—Frequency and depth of respiratory movements are increased by a current of 10 mA. Rest as in Fig. 3.

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until the relation had become 1 : 9, the reverse of that used in *Leduc's* experiments. In spite of these efforts the results could not be changed markedly. Even the alternating current was found to give the same effect, viz. general muscle tetani, arrest of respiratory movements and suffocation at last. Since no one of the currents was able to produce a narcosislike state, the authors think it improbable that such a condition might be produced by any electric current whatever. The same pessimism has been expressed by *Zimmern* in 1933. He also gives as his opinion that the electric current will probably never be useful for narcosis in man. The experiences in man, published by *Hertz* (1933), will be given now. Besides in dogs, he took the opportunity to practise *Leduc's* current in five men, using strengths up to 6 x so great as had been used when *Leduc* had submitted himself to the experiment. The shape of the electrodes and the places at which they were put were chosen in full agreement with *Leduc's* directions. The result was, that loss of consciousness or anæsthesia was produced in none of the patients. His interpretation of *Leduc's* results is just the same as ours, given in 1933 : excitation with general muscle spasms and arrest of respiratory movements. *Hertz* emphasises that neither in man nor in the dog does the condition produced merit the name of electric " sleep."

From this review it may be concluded that those veterinary meat hygienists who appeal to *Leduc's* results and to those obtained by others who applied *Leduc's* currents do not build on solid ground when they apply the current for stunning purposes in the slaughterhouses.

In all the experiments described the current used was weak, however, if compared with the currents which are used in the slaughterhouses with the aim to stun pigs. It would be possible that the effect of the latter differed notably and perhaps fundamentally from those described.

With the purpose of investigating this question experiments were carried out on animals of various species. The same apparatus was used which is applied in the slaughterhouses where the interrupted constant current is practised.

Apparatus Used in Our Experiments

The apparatus which had been put at our disposal by the manufacturer contains a motor generator, by which a constant current is given and which at the same time drives the rotating interruptor. The motor is fed by the 220-volt alternating current (a.c.) of the town. The interruptor is built up by three metal bows taking each almost 120° of a circle and separated from each other by a non-conducting mass about 2 m.m. broad. This rotating circle makes and breaks the current which is lead by two coal brushes placed against its outer edge in such a manner that the brushes are connected by a metal bow,

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if not an insulating strip is found between them. Since the distance between the brushes is not more than about 14 mm. and the metal bows have a length of about 51 mm., the circuit can be calculated to be closed during 73 per cent. and opened during 27 per cent. of the time taken by a revolution. So the relation between the two is 2.7 : 1. From position I to position II of Fig. 1 the circuit is closed, from II to I it is opened.

As Fig. 1 shows, the current is made and broken three times in each revolution, and since 2,800 revolutions per minute are made the current is interrupted 8,400 times p.m. It has a tension of 70 volts.

The current generated by the apparatus was recorded by Einthoven's string galvanometer. It was shown to be not a pure intermittent constant current as *Leduc's* current was intended to be, but every period exhibited two extra summits with the result that besides 140 interruptions per sec. the current undergoes 280 alterations in that time (a and b in Fig. 2).

Method

The effect of the current was studied in the cat, the goat and the pig.

The contact with the animal was made by placing the electrodes, combined to a forceps, on either side of the skull under the ears, after having soaked them with a 20 per cent. salt solution. Their shape and dimensions have been described in an earlier paper (1934). The current passed the skull during 10-15 secs., in accordance with the instructions given with the apparatus. For special purposes it was applied for a longer or a shorter time. By applying potentiometer connection the tension used could be varied at pleasure. The strength was read on a milliamperemeter which had been placed in the circuit.

Results

A. In the cat.—In the cat the current if the full tension is given reaches a strength up to 500 mA. when the skin resistance is low (about 140 ohms). Most often the latter decreases somewhat during the experiment in consequence of a more thorough soaking of the skin.

When the currents of 100 mA. or more are given the signs exhibited by the trunk, the legs and the tail do not differ notably from those exhibited by the animal submitted to the alternating current, and which have been described earlier (1933 and 1934), viz., tonic spasms at first, then clonic spasms all over the body, the eyelids included. The latter begin at the offset of the current and last 40-45 secs. Effects of excitation of the autonomic nervous system (eyes, eyelids, hairs, tail, transpiration of footsoles, salivation) are conspicuous also. As soon as convulsions have vanished the eyelids are opened maximally and maximal mydriasis becomes visible now, together with exophthalmos. The

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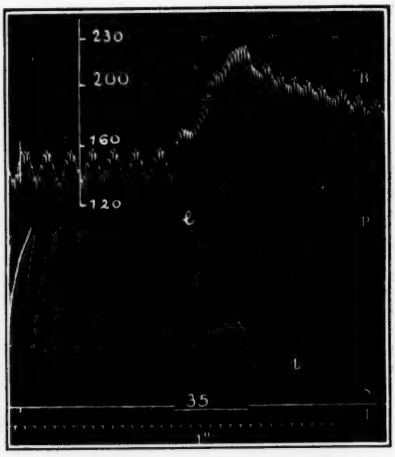

Fig. 5.—Arrest of respiratory movements with transition from the expiratory to the inspiratory position by a current of 35 mA. Rise of blood pressure. For the rest see Fig. 3.

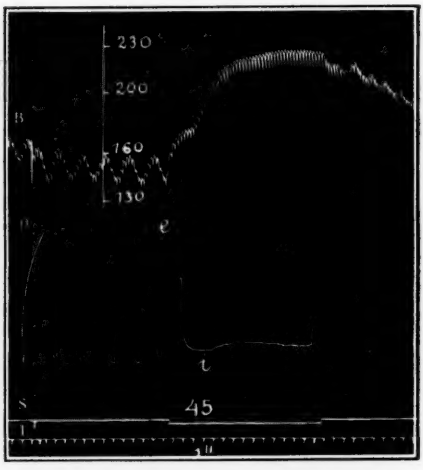

Fig. 6.—Arrest of respiratory movements in inspiratory position of the thorax by a current of 45 mA. For the rest see Fig. 3.

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tail is erected some seconds after the current has been switched off (5-10 secs.) and it has the shape of a duster; also the hairs of the neck and the back are erected. A difference between the effect here and after use of the a.c. is shown by the nystagmus of the eyeballs which is less intensive here and in a horizontal direction exclusively.

Many experiments gave the impression that the tonic muscle spasms were less violent here than in the animal submitted to the a.c. whereas the clonic spasms and the convulsions persisted longer. This relation was not found constantly, however. It is interesting that currents from 75-175 mA. will generally produce more violent clonic muscle spasms than currents of 200 mA. and higher. On the other hand, intensity and duration of the tonic spasms increases with the strength of the current.

The course of the signs of sympathetic excitation is striking. It may happen that 1-1½ min. after the current had been switched off the eyelids are suddenly reopened maximally, the pupils coming into maximal mydriasis. The observation that under these conditions the conjunctival reflex becomes negative anew after having been elicitable before, shows fairly the correlation between eyelid reflex and sympathetic excitation. It affirms our conclusion from earlier experiments (1935, 1936) that absence of the conjunctival and the corneal reflex does not prove anything concerning the condition of the central nervous system in animals submitted to the electric current. In consequence of the excitatory state of the sympathetic nervous system the eyelids may be hindered to answer the stimulus even if they receive it from the nervous system in the normal way.

Excitation of the cerebrospinal and the autonomic nervous system are also observed, when weak currents are applied. So currents of 4 mA. are able to produce tonic muscle spasms, currents of 12 mA. being sufficient for excitation of the autonomic system. An animal submitted to a current of 16 mA. exhibits the characteristic signs of the tail completely.

Neither are the medullary centres spared by the i.c.c.; they are even very sensitive, the respiratory and the vasomotor centre especially. In some experiments a current of 2 mA. and less was able to stimulate both. Currents stronger than 10 mA. generally produced rise of blood pressure. The effect on respiration varies with the intensity of the current. Currents with a strength below 10 mA. generally produced slowing of respiratory movements, whereas currents of 10 mA. and a little more increased both frequency and depth. Generally the threshold value for excitation of the vasomotor centre was found near 10 mA. The effects of these weak currents are shown by Fig. 3 and Fig. 4.

If currents of 20 mA. and more are used respiratory movements are arrested. The position in which the thorax is fixed by weak currents is not constant, but there is striking agreement with the a.c. on this point, that 40 mA. presents a border intensity again: currents of greater strength arrest the

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thorax in an inspiratory position in far the most experiments, whereas below that point excitation of expiratory nerve fibres dominates. The transition from the inspiratory to the expiratory position is often seen sharply when currents of about 40 mA. are used. An example is given by Fig. 5 and Fig. 6.

Currents from 70 mA. up to 500 mA. seem to excite strongly both inspiratory and expiratory fibres, with the result that at first the thorax is fixed in inspiration whilst the expiratory standstill follows, be it sometimes after the current has been switched off (Figs. 7, 8 and 9).

The vagus centre is far less vulnerable for the current used here than for the a.c. and its reaction is not constant. Its excitability varies in various experiments. In general, currents up to even 70 mA. do not excite it, with the result that weak currents may produce high increase of blood pressure (Fig. 1) without vagal inhibition.

This experience explains the result obtained by *O. Roos* (1916), who was surprised that "electric sleep" by *Leduc's* currents was accompanied by a rise of blood pressure although currents of 2 mA. and even less had been applied.

On the other hand, excitation of the vagus centre, which is evident when currents stronger than 70 mA. are used, persisted after the current had been switched off and the other signs of medullar excitation had already disappeared (Fig. 8).

If the current is intensified a point will be found where the vagal effect has reached its maximum. Stronger currents (300 mA. and more) even affect the vagus activity very little or not at all. An example is given in Fig. 9.

The symptoms presented by the eye and the eyelids differed from those produced by the a.c. only in this respect, that the eyelid reflex was not influenced in the same degree on either side. The effect was the most evident at the cathode side.

Most animals remained quiet some minutes after the current had been switched off; in some cases, however, they became angry about one minute after the current had passed. This condition did not take more than some minutes. Signs of katatonia were never observed in the cat, even if it had been submitted to the current repeatedly within one hour. Artificial attitudes were never maintained although the animal might be dozy.

B. In the goat.—In the goat the current may reach an intensity of 1,000 mA. If a current of 100 mA. or more is given the animal falls down immediately in consequence of abrupt tonic contractions of the skeletal muscles. If the animal had been placed on a table with four holes through which the legs are left free, the latter were flexed in the joints, the tail being drawn downwards at first. When the current was given during a longer time (10 or 15 secs.) the tail was moved in an upward direction as far as possible and it was put on the back during the time the current passed. At the same time the hindlegs are stretched and hairs on neck and back are erected. Other signs

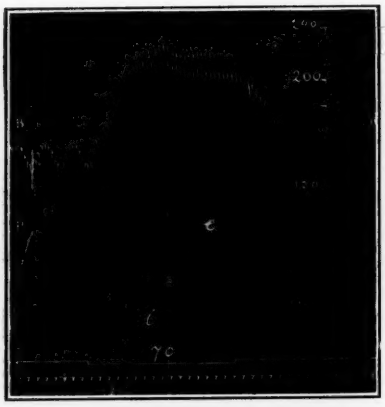

Fig. 7.—Effect of a current of 70 mA. No vagal effect. For the rest see Fig. 3.

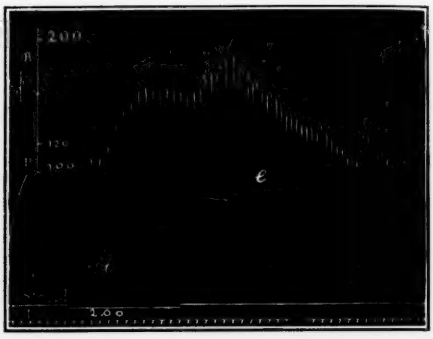

Fig. 8.—Effect of a current of 200 mA. Vagal stimulation persists after the current had been switched off. For the rest see Fig. 3.

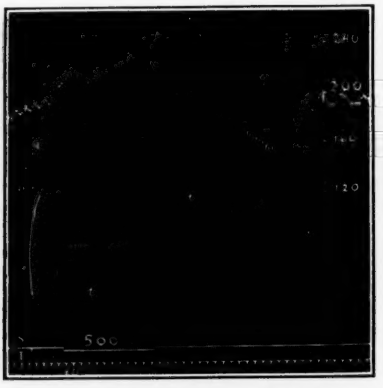

Fig. 9.—Effect of a current of 500 mA. No vagal effect. For the rest see Fig. 3.

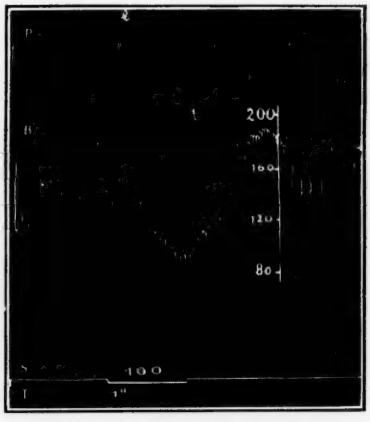

Fig. 10.—Goat, submitted to a current of 100 mA. Strong respiratory effect, whilst neither the vasomotor centre nor the vagus centre are influenced in a notable way.

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of sympathetic excitation are also observed now; the eyelids, which at first had been closed spasmodically are opened now to about the half and the membrana nictitans is drawn away to about the half of the bulbus.

Tonic muscle spasms begin to decrease at the moment the current is switched off or even before it. Then the animal may seem quiescent during some time which is followed by a period of clonic spasms and convulsions. Most often the convulsions and the muscular fibrillations set in about 40-100 secs. after the current was opened and they last one minute or longer. As a rule this period is interrupted from time to time by a short pause, during which the tail falls back from its extensor position to flexion. In general the spasms are less violent than in the cat.

About 7-10 secs. after the current had been switched off the bulbi oculi exhibit nystagmus horizontalis which takes 10 secs. or more; it increases when convulsions increase. At the same time the eyelids are opened wider.

Variations on the scheme given here may be observed of course. So the signs of sympathetic excitation may sometimes not be observed during the time that the current passes. This is the case peculiarly when weak currents are used. In other animals clonic spasms could be observed as early as during the time that the current passed.

In the goat the effect of the current on respiratory movements was shown to be a violent one. After the experiment the animals were often dyspnœic and 5-6 mins. after the current was broken the frequency of respiratory movements might rise to 180 and even to 250. On the other hand, the influence on the vagus centre and on the vasomotor centre was much less than had been observed in the cat. Even currents of 100 mA. did not attack them in an obvious way. An example is given in Fig. 10. Currents of higher intensity excited all three centres of the myelencephalon mentioned.

A striking after effect is the following: some animals exhibited a staggering gait, whilst others were not able to keep their legs before about four mins. had elapsed. Some animals, submitted to a current of 300 or 350 mA. during 15 secs., showed abnormal attitudes and abnormal gait in so far that they walked circlewise with atactic movements of the forelegs especially. The circle became smaller and smaller until the animal fell to a side in a helpless condition. Ten minutes after the current had been opened the animal had not yet regained muscular control and made defensive movements when it was held fast. Others again were unable to see and during some minutes they ran into any obstacle placed in their way.

In other experiments, especially when currents not stronger than 100 mA. had been given, the behaviour of the animal was characterised by increased excitability. Optical and acoustical reflexes were exaggerated and the animal's line of travel was not straight but curved. Still other animals tended to run without seeing obstacles. A constant relation between the motion and the direction in which the current had been given could not be established.

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Whereas the nystagmus of the eyeballs observed in the goat (horizontal and rotatory nystagmus was observed) may result from excitation of the cerebellar cortex, the underlying abnormal gait points to an after effect produced by the hemispheres and the brain stem.

Another striking effect observed in the goat is the katatonic syndrom. Whereas such symptoms had never been observed in the goat after applying the a.c. they could be observed now in animals which had been submitted to the current not more than two or three times. The katatonic state was not always found all over the body. To give an example: a goat which had been submitted during 15 secs. to currents of 300 mA., 185 mA. and 215 mA. respectively with pauses of ten minutes maintained artificial attitudes of the forelegs. They could be placed one on the other without inducing the animal to correct its position. Artificial positions of the hindlegs were corrected immediately. Some animals stood with open eyes, seemingly unresponsive to stimulation. When they were tried to be moved forwards by pulling the horns in this direction they resisted by placing the forelegs forwards and by flexion of the neck. Resistance was offered exclusively, however, if the animal was tried to be removed in a forward direction. Movements backwards could be induced very easily: a slight pressure by a finger on the forehead was sufficient for this purpose. So it is not correct to indicate the condition as negativismus. Artificial attitudes remained maintained. Most often the katatonic condition had disappeared next day; but the animal was still muffish and had no appetite. In Fig. 11 (a, b and c) an animal is shown, in which fore- and hindlegs are kataleptic. It had been submitted to the current three times in one afternoon. Artificial positions of neither the forelegs nor the hindlegs were corrected.

Besides the hair erection on neck and back dorsal flexion of the tail is the most conspicuous sign of sympathetic excitation in the goat.

The course of the eyelid reflex in the goat under the conditions of the experiment is interesting. It will be discussed further on. Only some points will be noted here. The direction of the current and not its strength or duration was decisive for the time during which this reflex was absent. In far the majority of cases the reflex was found to be absent during the longest time on that side where the cathode had been placed; so times of 6 secs. and 20 secs. respectively have been found for the eyes of one and the same animal. In another experiment the reflex was lacking during not more than 5 secs., although a current of 800 mA. had been given during 15 secs.

C. In the pig.—In the pig the effect of the current does not differ fundamentally from that described for the goat and cat. Currents of 50 mA. and more arrest respiratory movements. Most often the thorax is fixed in expiratory position, as is shown by Fig. 12.

The respiratory centre is sensitive for much weaker currents, however. Currents of a few mA. already excite it and by currents of 200 mA. and more

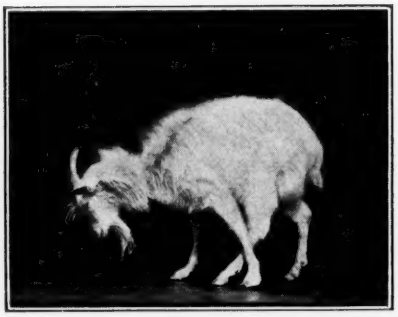

Fig. 11a.—Katatonia in the goat. Artificial abnormal position is not corrected. Homolateral legs are crossed.

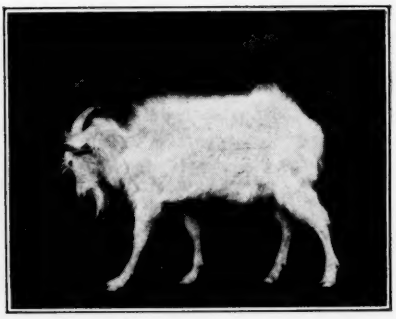

Fig. 11b.—Homolateral legs are placed far from each other. Rest as in Fig. 11a.

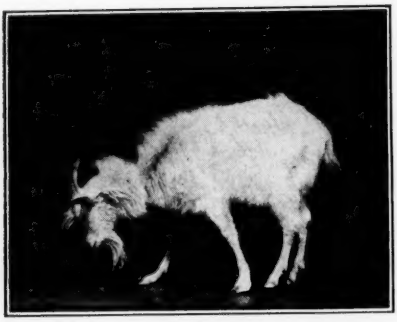

Fig. 11c.—One of the forelegs has been placed forward, the other backward. Rest as in Fig. 11a.

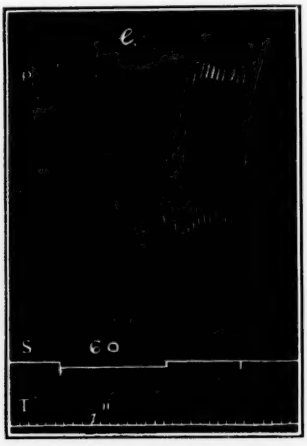

Fig. 12.—Arrest of respiratory movements during expiration. Pig submitted to a current of 60 mA.

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it is sometimes attacked so violently that some time after respiratory movements had begun they suddenly stop anew with the result that the animal would have suffocated, if artificial respiration had not been carried out. The eyelid reflex was elicitable and there was no trace of unconsciousness during the second period of stopping.

The vasomotor centre seems to be less sensitive for the i.c.c. than for alternating currents although currents of 100 mA. or more produce a rise of blood pressure of some 50 per cent. in spite of the vagal effect which is intensive too, and which still lasts 10-20 secs. after the current had been switched off. Cases of well pronounced katatonia were not observed.

Summarising the signs described, the effect of the intermittent constant current on animals of various species is characterised by increased activity of the stem ganglia and the medullar centra. The same had been found previously for the alternating current. Symptoms of decreased function of the central nervous system or of any part of it could not be observed. Neither effect of the a.c. nor that of the i.c.c. shows any agreement or resemblance with what is generally adopted as narcosis or sleep. Contrary to this, the effect of the current shows more agreement with the action of poisons which produce spasms by excitation of the nervous system. Neither is it possible to consider the effect of the current similar to the excitatory state which may precede the condition of unconsciousness produced by narcotics. For the excitatory effect of the current persists and a stage of decreased activity of the central nervous system does not follow.

The observation made by others and ourselves, viz., that the same current which had been applied in order to stun the animals could wake them afterwards does not surprise. As an example, the experience of *Rabinovitch* (1906), who worked with *Leduc's* current, may be mentioned. It is difficult to understand how such an effect could be explained in another manner than as excitation.

Another experience has been given by *Doussain* (1923). Whereas the condition of anaphylactic shock was abolished and could be prevented by chemical narcotics of various kinds it was not possible to influence it by the so-called electro-narcosis. The anaphylactic state was neither abolished nor prevented by it.

The Eyelid Reflex

Some observations relating to the eyelid reflex in animals which had been submitted to the i.c.c. deserve attention.

(a) In some cats the symptoms of sympathetic excitation of the eye returned after they had vanished and after the eyelid reflex had been elicitable in the normal way during one to two minutes. This reappearance was accompanied by a second period of loss of the eyelid reflex.

One animal had been submitted for 10 secs. to a current of 100 mA. It

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had shown convulsions in which the eyelids had been involved also. After the eyelids had been opened maximally and the eyelid reflex had been abolished these symptoms disappeared and the reflex had been normal during 1½ minutes. Then suddenly signs of sympathetic excitation started for a second time. The lids opened wide and maximally dilated pupils could be seen. At the same moment the eyelid reflex was abolished again and its absence persisted as long as the period of sympathetic discharge continued.

Even for those who consider absence of the eyelid reflex as evidence for loss of consciousness, it will be clear that it is difficult to assume that a second period of unconsciousness sets in suddenly, separated from the former by some minutes. Accepting our view given in an earlier paper (1933), the relation can be understood in a simple way: as the result of sympathetic excitation the eyelids are hindered to react on the stimuli they receive.

(b) Another observation is this: the period during which the reflex is absent varies according to the direction of the current. Generally the eye on the side where the cathode was placed was observed to have lost the eyelid reflex for far the longer time, as is shown by Table 1. In some few experiments another relation was found; displacement of the electrodes will most probably not be the cause of this.

TABLE 1.

Goat.			
Strength of the current.	Time during which the current passes.	Eyelid reflex absent during Cathode side.	Anode side.
85 mA.	10 secs.	0 secs.	0 secs.
800 „	15 „	22 „	7 „
860 „	„ „	20 „	7 „
860 „	„ „	17 „	5 „
860 „	„ „	20 „	5 „

(c) The time during which the eyelid reflex is abolished in animals submitted to the i.c.c. is not increased when a current of moderate strength is intensified. Some figures are given in Table 2.

TABLE 2.

Goat.			
No.	Strength of the current.	Time during which the current passes.	Eyelid reflex absent at the cathode side during
1	300 mA.	15 secs.	7 secs.
	640 „	„ „	20 „
	780 „	„ „	15 „
	940 „	„ „	6 „
2	600 mA.	15 secs.	25 secs.
	900 „	„ „	10 „
	920 „	„ „	5 „

(d) Neither was the period during which the reflex was absent lengthened when the current had been applied during a longer time. An example is given in Table 3.

TABLE 3.

Pig.		
Strength of the current of 70-volt tension.	Time during which the current passes.	Eyelid reflex absent during
300 mA.	10 secs.	40 secs.
300 „	15 „	35 „
340 „	30 „	20 „

(e) The period of absence of the eyelid reflex decreased if the animal had been submitted to the current some time before, be it during the same afternoon or in the morning. Some figures are collected in Table 4.

TABLE 4.

Goat.			
Strength of the current.	Time during which the current passes.	Eyelid reflex absent during	
0–90 mA.(1)	10 secs.	15 secs.	
„ „	„ „	7 „	
„ „	„ „	5 „	
0–250 mA.(1)	10 secs.	15 secs.	
0–300 „	15 „	20 „	
0–350 „	„ „	8 „	
		cathode side	anode side
220 mA.	15 secs.	30 secs.	21 secs.
220 „	„ „	13 „	8 „
240 „	„ „	20 „	20 „
240 „	„ „	17 „	13 „
240 „	„ „	10 „	10 „
220 „	„ „	—	5 „
140 mA.	10 secs.	30 secs.	
150 „	„ „	7 „	
150 „	„ „	<9 „	
190 „	„ „	14 „	
250 „	„ „	9 „	

(f) In some experiments in the pig the eyelid reflex could be demonstrated again a surprisingly short time after the current had been switched off. A positive reflex after two to five secs. was not seldom observed in animals which had been submitted to the full current (800-900 mA.) during 15 secs. It must be noted here that analogous short times have been observed

(1) Here the strength of the current increased gradually during half the time and remained on its maximum during the rest.

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in the slaughterhouses and have been described in reports on the use of the alternating current.

The conclusion which follows from the experiments with the intermittent constant current as applied in the slaughterhouses does not differ notably from that given previously, when the effect of the a.c. was studied: the picture given by animals submitted to the i.c.c. is characterised by symptoms of excitation of the central nervous system. Signs of stunning, exhaustion, or protection are not observed. For details the reader is referred to earlier papers and to this Journal (vol. 90).

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THE OCCURRENCE OF LACTATION TETANY IN IRELAND

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THERE can be little doubt that the disease now called lactation or grass tetany has been recognised, especially by clinicians, for many years. It was disguised under such names as "atypical milk fever," or more simply, "staggers," until the work of Sjollema (1930) in Holland became better known, since when numerous workers have studied the condition in some detail.

Most writers on the subject express the opinion that the disease is more

prevalent than formerly, but in the absence of reliable statistics this must be pure conjecture, especially in view of the fact that careful observation over a number of years by Blakemore and Stewart (1933) show that its incidence in a particular district fluctuates widely from year to year. Moreover, the increased interest concerning the ætiology and pathogenesis of the disease is likely to have increased the number of cases reported. There is no doubt, however, that in some districts, perhaps the majority, where cattle raising and milk production are carried out intensively, lactation tetany is the cause of considerable loss.

The distribution of the disease appears to be widespread, authentic cases having been reported from New Zealand, many countries on the Continent of Europe, England, Scotland, and to this list must now be added Ireland. When Browne (1937) raised the matter in a paper read before the Veterinary Medical Association of Ireland, it was revealed in the discussion which followed that lactation tetany was comparatively well known to Irish clinicians. At this meeting cases were reported as having occurred in many parts of the country, but it appeared that no blood analyses had been carried out, diagnosis being based entirely on the clinical symptoms shown by affected animals. For this reason further investigation was thought desirable. The opportunity to do so arose in the early part of 1938 when reports of suspected cases of lactation tetany were received from several practitioners. Four outbreaks were selected for investigation, chiefly because widely differing methods of management were practised by the owners of the herds in question.

Since the symptoms and post-mortem changes associated with lactation tetany have been accurately described by numerous writers, it is not proposed to discuss them here in detail. Excellent accounts have been given by Sjollema (1930), Dryerre (1932), Hare (1932) and Blakemore and Stewart (1933). It is only necessary to say that the cases observed during the present investigation showed typical symptoms of the acute or subacute form of the disease.

In each case two samples of blood were obtained from the jugular vein, one being received into a bottle containing potassium oxalate and the other being allowed to clot naturally. On receipt of the blood at the laboratory, the hæmoglobin was immediately determined in the oxalated blood using the Sahli hæmoglobinometer. The plasma was then separated from the corpuscles by centrifugalisation, and the total nitrogen determined by Kjeldahl's method. The non-protein nitrogen was determined by precipitation of the proteins from the plasma by trichloracetic acid and estimation in an aliquot of the clear filtrate. The Ca, P, Mg, Na, K and Cl were determined in the serum by the following methods: Ca by the Clark and Collip (1925) modification of the Kramer and Tisdall method, P by the method of Fiske and Subbarrow (1925), Mg by a slight modification of the Denis (1922) method, and Na and K by the method of Kramer and Tisdall (1921). The Ca, P, Mg, Na, K and Cl are

expressed in mg. per 100 c.c. serum, the N.P.N. in mg. per 100 c.c. of plasma and the total protein in g. per 100 c.c. plasma.

For the analysis of the grass and hay samples, the methods described in the technical communication of the Imperial Bureau of Nutrition were used. For the Mn estimation a slight modification suggested by Green (1938) of the method of Richards (1930) was employed.

To turn now to a more detailed discussion of the particular cases under consideration.

Outbreak No. 1

The first outbreak studied was in a herd of ten pedigree Hereford cows kept solely for the production of calves. These animals were never housed and received no concentrated food whatsoever, their sole diet being grass with the addition of home-grown hay during severe weather, but as the weather had been particularly mild up to the time of the outbreak no hay had as yet been given.

One cow suffered from an attack of lactation tetany on December 27, 1937, and died twelve hours later. This animal was not seen, but on January 3, 1938, another animal became affected. This cow, cow A, Table II, was in excellent condition, six months in calf with calf at foot and was first observed to be ill at 9 a.m., having appeared normal the previous evening. At 11 a.m. there was marked hyperasthesia which became intensified on approach, rapid palpating heart beat which was impossible to count with accuracy, normal temperature, laboured respirations, staring eyes and muscular twitching, chiefly involving the muscles of the neck, head and eyelids. The animal was propped on her sternum in a corner of the field and was able to rise on to the hind legs but could not get up completely. Blood samples were taken and calcium therapy given. At 2 p.m. the hyperasthesia was considerably less and the muscular twitching had disappeared, but the animal was still unable to rise and had not fed nor ruminated. However, recovery was complete by the following morning.

The owner was well acquainted with the condition and stated that he had had sporadic cases for the past twenty years, but only in pedigree cows and never in a commercial milking herd of mixed breed which was also maintained on the farm. On inquiry, it was revealed that the two herds were kept entirely separate. The Herefords had continually grazed on one part of the farm only, area A, Table I, the other pastures, area B, Table I, being reserved for the milking cows which were housed at night and received concentrated food.

Additional blood samples were taken from seven pedigree cows, including two heifers in calf for the first time and also from two of the milch cows. Grass samples were also obtained from the two parts of the farm. The results of the analyses are given in Tables I and II.

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TABLE I

COMPOSITION OF GRASS AND HAY SAMPLES (ON 100% DM.)

Description	Total Ash	Sol. Ash	CaO	P_2O_5	Ether Extract	Crude Protein	Fibre	MgO	Mn
Outbreak I.									
Area A ...	10.06	3.75	0.48	0.83	3.09	16.23	24.40	0.272	0.0813
Area B ...	11.69	4.99	0.57	1.03	3.87	13.66	24.22	0.283	0.0583
Outbreak II.									
Hay ...	7.11	2.34	0.38	0.29	1.79	6.94	33.24	0.222	0.0568
Grass ...	8.84	2.97	0.48	0.52	3.28	14.22	18.81	0.353	0.0656
Outbreak III.									
Hay ...	6.41	3.82	0.67	0.36	1.44	7.81	33.35	0.207	0.0495

TABLE II

OUTBREAK No. 1

Blood Analysis

Description	Ca	P	Mg	K	Na	Cl	NPN	Total Protein %	Hb %
Cow A	5.73	5.17	0.99	26.7	345.7	413.0	—	8.75	88
Cow 1	11.20	4.92	1.59	24.8	355.6	433.1	—	8.88	72
Cow 2	10.13	4.92	0.69	26.8	347.5	442.5	—	8.26	70
Cow 3	10.87	4.33	2.50	19.0	305.0	385.0	23.2	7.73	—
Cow 4	9.75	5.60	2.12	19.9	314.0	370.0	22.4	7.20	70
Cow 5	10.42	4.68	2.10	22.3	284.3	385.0	19.1	8.22	65
Heifer 6	11.67	4.91	2.25	28.9	326.7	434.2	—	8.41	75
Heifer 7	10.88	5.70	2.24	20.6	303.1	348.0	37.8	6.81	74
Fresian 8	11.02	5.78	2.10	23.6	334.9	385.0	27.1	7.32	84
Shorthorn 9 ...	10.42	4.48	2.51	19.6	339.3	340.0	25.2	—	75

Outbreak No. 2

The second outbreak investigated was in a non-pedigree herd of thirty Shorthorn cows kept for the production of milk. During the winter the cows were housed at night, but turned out to pasture in the daytime and were given concentrated food at the rate of 13 lbs. per day per cow in two feeds, one in the morning and the other in the evening. The ration was composed of 2 cwts. dried Brewer's grains, 1 cwt. cotton cake and ½ cwt. sugar-beet pulp. In addition the cows received as much good quality old meadow hay as they cared to eat.

One cow which had calved about four weeks previously suffered from a subacute attack of lactation tetany on the evening of January 10, 1938. She received 1 oz. magnesium sulphate intravenously and 1½ lbs. magnesium sulphate per os. Unfortunately it was impossible to visit the farm until January 12 when the cow had completely recovered and appeared normal in every respect. Blood samples were taken at this visit from the affected cow, cow A, Table III, and from eleven others. Samples of hay and grass were also obtained. The results of the analyses are given in Tables I and III.

TABLE III

OUTBREAK No. 2

Blood Analysis

Description	Ca	P	Mg	Na	K	Cl	NPN	Total Protein %	Hb %
Cow A	11.35	3.91	0.87	311.3	21.9	350.0	31.3	7.63	—
Cow 1	10.97	4.48	1.53	—	21.6	385.0	34.3	6.62	66
Cow 3	12.47	5.38	1.76	375.1	20.8	385.0	37.3	7.06	66
Cow 20	12.41	5.58	1.78	339.2	22.5	368.0	28.5	7.87	72
Cow 27	11.47	5.00	2.17	344.6	21.1	378.0	28.9	7.63	62
Cow 37	11.95	4.00	1.18	324.0	20.4	392.0	29.8	7.03	64
Cow 13	10.82	5.40	1.90	334.9	20.6	395.0	35.0	7.69	65
Cow 15	10.75	5.30	2.21	336.5	29.6	—	—	—	—
Cow 16	11.55	4.48	1.55	331.3	22.5	435.0	51.6	7.30	72
Cow 19	11.22	5.20	2.14	335.6	26.7	435.0	44.5	7.63	60
Cow 29	10.75	6.10	0.73	324.0	24.6	417.0	38.3	7.75	65
Heifer 35	11.15	5.82	0.98	321.2	22.7	457.0	70.9	8.01	69

Outbreak No. 3

The third outbreak investigated was in a herd of twenty-five cows of mixed breed, Friesian and Shorthorn types predominating, kept within the City of Dublin for the production of milk. The cows were housed continuously from the middle of October until the beginning of May and received a ration composed of two parts bran, one part cotton-seed cake, one part linseed cake and one part wet Brewer's grains. The ration was mixed and each cow received one part immediately and one part twenty hours later. In addition, good quality old meadow hay was fed. Calf rearing was not undertaken at the dairy, dry cows being sold and replaced by freshly calved non-pregnant cows.

Thirteen cows had been affected with lactation tetany in May and June, 1937, a few weeks after they had been turned out to pasture for the summer months. Three of these animals died from the acute form of the disease, but no investigation of this outbreak was made. On January 14, 1938, another cow died suddenly with acute lactation tetany although the cows had not yet been turned out to pasture. This animal was not seen alive, but a detailed post-mortem examination was made. The only finding was a diffuse gastro-enteritis. On January 15, 1938, yet another cow, Cow A, Table IV, was affected in the same way. When visited the cow was still able to stand but difficult to approach. There was marked excitability, spasmodic movements of the jaws and frothing at the mouth. Muscular tremors were pronounced, the muscles of the whole body being involved. There was also paddling of the hind limbs, rapid laboured respirations and palpating heart beat, but the temperature was normal. Samples of blood were obtained and calcium therapy given. Immediately on the withdrawal of the needle after the calcium injec-

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Fig. 1.—Interceptor out of action and hanging free.

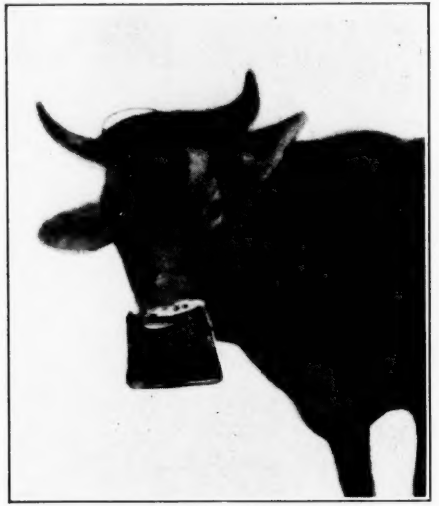

Fig. 2.—Interceptor functioning. The india-rubber sheet is stretched over the muzzle with openings at the rear. Nose band with canvas and hooks fastening apparatus.

tion, the cow collapsed as if shot and lay on its side with the limbs stiffly extended, dyspnœa became more pronounced and death followed in a few hours. The duration of the illness was not more than twelve hours.

Post-mortem examination revealed nothing abnormal, there being no gastro-enteritis in this case. However, it was thought advisable to exclude the possibility of poisoning and portions of the ingesta, liver and kidneys were retained for examination. This was carried out by the Public Analyst to the City of Dublin, who reported that no trace of any organic or inorganic poison could be detected. The rumen contents contained much volatile fatty acid, the nature of which was not determined.

Blood samples from a further thirteen cows were obtained. One of these, Cow B, Table IV, had suffered from lactation tetany in June, 1937. A sample of hay was also taken. The results of the analyses are given in Tables I and IV.

TABLE IV
OUTBREAK No. 3
Blood Analysis

Description	Ca	P	Mg	Na	K	Cl	NPN	Total Protein %	Hb %
Cow A	7.33	7.23	0.52	367.0	—	362.0	25.7	7.56	70
Cow B	10.41	7.06	1.99	353.0	31.3	383.0	33.1	7.87	70
Cow 1	10.15	—	2.31	288.7	29.9	405.0	40.8	8.60	—
Cow 2	10.15	—	2.13	306.9	—	440.0	36.4	8.30	66
Cow 3	10.42	—	2.37	288.7	—	412.0	61.9	7.88	60
Cow 4	9.88	—	2.21	315.8	—	378.0	50.5	7.85	60
Cow 5	—	—	2.30	270.7	—	440.0	83.8	7.78	—
Cow 6	10.00	—	2.04	279.8	—	417.0	17.4	8.16	—
Cow 7	11.22	—	2.43	330.3	—	428.0	49.0	7.78	—
Cow 8	10.82	—	2.50	276.2	—	417.0	76.2	—	70
Cow 9	10.08	6.12	1.85	319.5	—	406.0	45.7	8.81	58
Cow 10	10.55	6.74	2.12	298.6	36.7	430.0	42.9	9.21	66
Cow 11	10.49	—	2.17	259.9	—	420.0	40.8	7.82	65
Cow 12	9.75	—	2.31	286.9	—	—	33.3	8.28	62

Outbreak No. 4

The fourth outbreak investigated was in a herd of thirty-six non-pedigree Shorthorn cows kept for the production of milk and for calf rearing. At the time of the examination of this herd no case of lactation tetany had occurred for twelve days, but it was thought of interest to obtain blood samples since the cows had been at pasture for some weeks.

During the early part of the winter the cows were housed at night but turned out to pasture during the day. From the beginning of January until the beginning of March they were housed continuously and were then allowed out during the day. This practice was continued until the last week of March when the cows were turned out altogether, milking being done in the field. They received in addition to the grass and good quality old meadow hay, a

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ration composed of equal parts of sugar-beet pulp and wet Brewer's grains and 3 to 4 lbs. of crushed oats per day per cow.

The first case of lactation tetany occurred in February, two cows were affected in March and a fourth on April 10. All these animals showed the acute form of the disease and only one, cow 6, Table V, which was attacked in March, recovered. Blood samples from eleven cows were obtained on April 22 when they had been at grass for three weeks. The results of the analyses are given in Table V.

TABLE V

OUTBREAK No. 4

Blood Analysis

Description	Ca	P	Mg	Na	K	Cl	NPN	Total Protein %	Hb %
Cow 1	10.15	4.08	2.37	323.0	—	401.0	45.7	7.59	—
Cow 2	—	4.93	1.87	298.7	—	430.0	—	—	—
Cow 3	10.82	4.77	2.11	350.0	—	440.0	39.8	8.71	—
Cow 4	10.42	4.83	1.76	325.0	23.3	417.0	41.6	8.49	58
Cow 5	10.70	3.86	2.17	315.0	24.8	440.0	40.9	7.70	—
Cow 6	10.70	3.23	1.51	341.0	23.3	440.0	42.0	6.69	—
Cow 7	10.28	4.88	1.75	316.0	22.0	410.0	41.1	8.50	68
Cow 8	10.42	3.79	2.48	327.8	19.9	440.0	—	—	—
Cow 9	10.95	5.30	2.59	344.0	23.6	417.0	35.9	7.70	—
Cow 10	10.70	4.00	1.93	—	26.5	—	45.3	7.50	—
Cow 11	11.62	3.16	1.48	334.0	22.4	—	—	—	—

Discussion

The outbreaks of lactation tetany described in this paper are so similar to those recorded by other writers that little further elaboration is necessary. There is the sudden onset of an attack, the same clinical syndrome and the same changes in the composition of the blood, particularly the serum calcium and magnesium.

It appears that the disease in Ireland, as elsewhere, occurs more commonly in particular districts or even on particular farms in those districts, though further evidence on this point is desirable and that cases are met with at the same time of year as reported by other writers. In this connection it has not been possible to obtain any record of cases occurring in Ireland during the latter part of the summer, autumn or early winter. On the other hand, lactation tetany is said to occur almost exclusively when cows are first turned out to pasture in the spring. This is not the case in the outbreaks described here, nor is there any change in feeding or other disturbance in the normal routine of the cows to account for the sudden onset of an attack. Outbreak No. 3 is presumably an example of the so-called alimentary or stall tetany of German writers, but it is difficult to see any grounds for differentiation between the

two conditions save the fact that in the first case the animals are housed and in the second they are at pasture.

It would seem, therefore, that although lactation tetany in some districts usually occurs when the cows are first turned out for the summer grazing, it can and does occur at other times. In addition to this, it appears that some fright or sudden disturbance is not necessarily required to precipitate an attack. The striking feature of the disease is the rapidity and at times the severity with which it develops, but it is hard to escape the conclusion that there are predisposing causes which have been in action for some considerable time before clinical symptoms appear and that these are not unconnected with the diet.

It was noticeable that the pastures on the farms where outbreaks occurred were composed largely of poor quality grasses which Wright (1938) reports also to be the case in Lincolnshire and Herefordshire in areas where lactation tetany commonly occurs. The predominant grasses in these pastures were Yorkshire Fog (*Holcus lanatus*), Cock's Foot (*Dactylis glomerata*) and varieties of Foxtail (*Alopecurus* sp.). Also on all the farms the common sorrel (*Rumex acetosa*) was present in abundance. Rapidly growing coarse grasses such as these are not readily eaten and throughout the winter form rough tufts which cannot be of much nutritive value, but which from force of circumstance form the main bulk of the food eaten by the stock on the land. Apart from this, however, such a flora suggests that there is a lack of available calcium in the soil which appears to be reflected in the composition of the grasses themselves. The analyses given in Table I show that in every case the samples of hay and grass taken from the farms on which lactation tetany occurred had a badly balanced mineral content. These analyses also show that the manganese content of the samples was considerably above the normal figure. It may be mentioned here that Blakemore, Nicholson and Stewart (1937) also found an abnormally high manganese content in grass from affected farms in Lincolnshire. On the other hand, the magnesium content of the samples is within the normal range. Similarly, the concentrated food given to the cows, apart from other considerations, did not appear to possess a well-balanced mineral content and was probably rich in phosphorous and low in calcium.

In discussing the ætiology of latcation tetany most writers have been concerned with the small amount of magnesium present in the serum of affected animals. In this connection, Blakemore and Stewart (1935) showed that after cows which have a low serum magnesium have been on summer grass for some weeks, this invariably rises and, as has been pointed out previously, no cases of lactation tetany have been reported after this time. Whilst it is true that no case of the disease has been found in which there was not a low serum magnesium, yet it is also true that many perfectly normal cows possess a serum magnesium content which is as low if not lower than that of

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affected animals. Further, there is no evidence that affected cows have been receiving a magnesium deficient diet nor are the symptoms or post-mortem findings suggestive of a magnesium deficiency as described by Watchorn and McCance (1937) or by Greenberg and Tufts (1938) in rats. In addition to this, no satisfactory evidence has been produced to indicate that magnesium administration has any curative effect.

On the other hand, analysis of blood taken during an attack invariably shows that the serum calcium has fallen. This returns to normal on the recovery of the animal whereas the serum magnesium usually remains low. From an examination of the analyses of blood from cases of milk fever published by Greig (1930), it appears that the serum calcium during an attack of lactation tetany varies in the same way as it does in milk fever. Thus, Greig (1930) found that in eighty-two analyses of blood from milk fever cases, the serum calcium varied between 7.76 mg. and 3.00 mg. per cent. with an average of 5.13 mg. per cent. Sjollema (1930) found that in fifty-five cases of lactation tetany, the serum calcium varied between 9.45 mg. and 3.90 mg. per cent. with an average of 6.65 mg. per cent. This figure would probably have been lower but for the fact that in some cases mammary inflation had been applied before the blood samples were taken. Similarly, Blakemore and Stewart (1933) found calcium values varying between 8.90 mg. and 3.00 mg. per cent. with an average of 7.07 mg. per cent. in seven animals suffering from the disease, and in the cases described in this paper the two analyses of blood taken during an attack also showed that the serum calcium had fallen, the average of these two cases being 6.53 mg. per cent. But in any discussion on the ætiology of lactation tetany the significance of these findings seems to have been overlooked.

The importance of calcium in this connection is further emphasised by the fact that cases occur at a time when there is a great demand for available calcium both for the developing fœtus and the formation of milk. Moreover, calcium therapy alone is reported to have given beneficial results in many cases, and, as has been suggested above, there is now some evidence that the mineral content of the diet of affected animals is not well balanced particularly with regard to calcium. It is not suggested, however, that there is a gross calcium deficiency and the possibility that other metabolic disturbances may be involved besides an upset in the mineral metabolism must also be borne in mind.

The factor or factors which are responsible for causing the sudden onset of lactation tetany are difficult to determine, nor will they be determined until a great effort has been made to classify the type of tetany which prevails. The indications are that it is a true calcium tetany. Thus, it does not appear to be due to an alkalosis since Blakemore and Stewart (1935) obtained some evidence to show that an acidosis is usually present during an attack. Moreover, tetany due to an alkalosis is usually unaccompanied by an alteration in the

serum calcium. Another point which may not be without significance in this connection is that the total protein of the serum remains normal, suggesting that it is the free serum calcium which is fluctuating. It has been suggested by Dryerre (1932) that the actual symptoms may be due to an increase in the Ca/Mg ratio of the serum. It becomes apparent, however, that it is not a simple question of an alteration in this ratio since if such were the case, a fall in the serum magnesium should alone be sufficient to precipitate an attack. But, as mentioned above, symptoms of lactation tetany do not appear until there is both a low serum calcium and a low serum magnesium, and an alteration in the Ca/Mg ratio may exist without there being any symptoms of the disease. The fall in serum calcium which accompanies the onset of an attack might be expected to bring the Ca/Mg ratio within more normal limits, but in spite of this fall the Ca/Mg ratio is usually, though not always, increased.

The reason for the low serum magnesium and the sudden fall in the serum calcium has yet to be discovered, but from the facts so far established, it seems that an explanation may eventually be found in further elaboration of the work of Swingle and Wenner (1926) who showed that other metals may take the place of the calcium normally excreted in the fæces, thus preserving calcium for the essential needs of the body, and Wenner (1926) who showed that the onset of tetany in parathyroidectomised animals can be delayed by the administration of magnesium, but that once the serum calcium has fallen, the administration of magnesium has no beneficial effect.

In conclusion, it appears that certain practical measures can be taken to reduce the incidence of lactation tetany. The most important of these are an improvement in the general management of the herd, better feeding, particularly as regards the mineral balance of the ration, and an improvement of the permanent pastures by the application of lime and other measures. Finally, should a case of lactation tetany occur, calcium therapy appears to be the treatment most likely to assist the recovery of the patient.

Summary

Four outbreaks of lactation tetany are reported from Ireland. The affected animals showed characteristic symptoms of the disease and blood analyses revealed the same alteration in serum calcium and serum magnesium as reported by other observers. The outbreaks occurred in the early part of the year and no records of cases occurring during the latter part of the summer, autumn or early winter were obtained.

The disease attacked herds subject to very different methods of management. One of these was never housed, another was housed during the whole winter, whilst the other two were housed at night but turned out to pasture during the day.

From an examination of the blood analyses published here and by previous workers and after discussing the circumstances surrounding an outbreak,

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it is established that lactation tetany does not occur until there is both a low serum calcium and serum magnesium and that the onset of an attack is accompanied by a sudden drop in the serum calcium which returns to normal on the recovery of the patient.

The general conclusion is reached that the causes predisposing to an attack of lactation tetany are dietetic in origin and have been in operation for some time before symptoms of the disease appear. Exciting causes which seem to be intimately connected with calcium metabolism also play a part in the ætiology of the disease.

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Clinical Articles

RUPTURE OF THE ŒSOPHAGUS

By R. CRAWFORD, M.R.C.V.S.
Ardleigh

The patient was a cross-bred Shire mare which had, when first visited, a small swelling over the œsophagus about the junction of the upper and middle third of the neck, together with a high temperature. Very little food was eaten, but water was taken freely and the swelling gradually increased in size. After three or four days symptoms of choking were observed and as the swelling was fairly soft, especially in the centre, it was lanced and quite a lot (maybe half-pint) of greenish fluid escaped. The wound was probed with

the finger and several lumps of green chewed grass removed (about a double handful). A few hours after the swelling was lanced the temperature dropped to normal. Previous to that it was always high, about 105 deg. F., and the animal was ravenous about food and water. All the liquid food apparently passed through the wound and ran down the neck and foreleg to the ground, and any solid or semi-solid food set up symptoms of choking after the first mouthful was swallowed. This persisted until the food was removed through the wound with the finger. The animal was kept on gruel about 14 days when the wound gradually closed and less food escaped through it. Several pieces of dead muscle sloughed away and after complete resolution quite a noticeable depression on the neck was left. The case took place in the spring when the horses were first turned out to the grass. Needless to say, rupture of the œsophagus was not thought of until the swelling was lanced. The first tentative diagnosis was " adder bite," although the site of the swelling was at an unusual place because the hair and superficial skin were completely removed. A fresh horse had been turned out in the meadow with this one on the day previous to the injury and no doubt a kick was the cause of the trouble. The animal worked for several years afterwards, was able to eat all kinds of food without inconvenience, being eventually sold to a dealer, when all trace of her was lost.

EVERSION OF THE RECTUM IN A BULL

Successful Amputation

By RICHARD HUDSON, F.R.C.V.S.
Retford

THE subject was a Lincoln Red Shorthorn about 2½ years old.

For several weeks there had been a slight protrusion of mucous membrane at the anus at the time of service, but it had retracted without assistance, until it was found permanently out one morning.

After it had been out some hours I was called in, and found protruding a mass the size of a coconut. After cleansing and lubricating it I expected to replace it easily, but could not do so owing to the swelling which was formed chiefly about the sphincter ani.

The bull was straining frequently, and if I had been able to replace it there would have been difficulty in retaining it long enough in position to have received permanent benefit. It was not a case where there is just a protrusion of mucous membrane with infiltration, but one in which, owing to frequent prolapse, there had formed a considerable amount of hard tissue.

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It was decided that it should be amputated the following morning.

Operation.—Owing to frequent straining and injury by contact with the side of the stall, it was now about double in size and torn in places.

The patient was secured by fastening his nose high up to the hay rack and his tail was tied out of the way to a rope round his chest.

A spinal injection of 10 c.c. 5 per cent. cocaine was given (and not easily, owing to his tail being pushed up by the swollen mass). I did not want him recumbent and hoped the injection would be sufficient to anæsthetise so that I could operate standing. Anæsthesia was good, but not complete.

A loose ligature was applied and drawn on to enable a ligature of soft cord to be applied higher up, the idea being to check hæmorrhage and prevent fæces escaping, which happened every time he strained.

Two skewers were then passed at right angles to prevent the cut end from slipping back through the anus, and the everted mass cut off. About ½ inch of mucous membrane was left projecting so that when sutured it turned over the divided end.

Numerous sutures of flax thread were inserted at about ½ inch intervals and the wound dressed with antiseptic oil. The ligature and skewers were removed and the divided end slipped in through the anus. A daily injection of 2 or 3 ounces of antiseptic oil was given.

For a few days there was occasional straining, but nothing protruded and the case has finished satisfactorily.

I have never seen a similar case in cattle, though they have occurred frequently in other animals. A man on the farm said he had seen two cases in bulls on a farm in Lincolnshire, and that they had been put down, chloroformed, the bowel replaced, and they had done well.

Replacement depends on the part displaced. If it is the mucous membrane at the anus one cannot replace it satisfactorily because there is nowhere for it to go. If it is rectum it can be pushed back.

Sometimes one meets with a projection of mucous membrane which is simply an œdematous mass. By squeezing one can break it down and press out the infiltrating fluid; then what is left is easily replaced within the anus.

FOREIGN BODY PNEUMONIA IN THE DOG

By G. MAYALL, M.R.C.V.S.

Bolton

It is noteworthy, considering the number of people who keeps dogs, what a large proportion of them are ignorant as to how medicine should be administered to them. We are constantly having dogs brought to us that

shy at the sight of a spoon or a bottle because they have been half choked at their contents by reason of the top and bottom jaws being held apart when giving medicine or powders to them. Others are affected by troublesome coughs, due to throwing powders on the back of their tongues, their owners not remembering the spasms of the glottis that they themselves have endured on account of a crumb or grain of salt going the wrong way.

A more serious condition is produced when foreign particles get into the bronchi—mechanical pneumonia or bronchitis arises. Manipulating the larynx or pharynx when medicine is being given is also of too frequent occurrence by the laity.

On September 15 a rough-haired fox terrier was brought in because of persistent coughing. On inquiry we were told that both powders and medicine had been given with the jaws held open. The dog's temperature was 103, pulse small and quick and very irregular, breathing rapid and rough. Antiphlogistine was applied to the sides and a warm coat put over it. A dose of elixir was given and the patient put into an airy kennel with a hot bottle. The dog refused all food and drink, and on examination next day, in addition to the laboured breathing it was noticed that the mucous membranes of the lips and mouth were very pallid, so much so that one thought of some internal hæmorrhage. One teaspoonful of Armour's glycerin extract of red bone marrow was given three times daily in a wineglassful of water.

Next day the temperature was 102 and breathing slightly better, but still not eating or drinking. The red bone marrow was continued.

On the third day I took him a chicken's gizzard cut up fine, which he ate, and from that time he began to take "Red Heart" food and milk, and slowly progressed to normal health. The pale mucosæ improved on the third day, and the dog was discharged cured nine days after he came in.

On the fifth day he got excited at any noise, and seemed hysterical. A pill of pot. brom. gr. 1, chloral hydrategr. 1 and ext. belladonnæ gr. ¼ was given each night and a few of these pills sent home, as it is very annoying to have a dog go home apparently quite well and a few days after the owner sends for you to treat him for hysteria. In this instance, however, the dog has progressed satisfactorily.

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AN UNUSUAL COMPLICATION OF PARTURITION

By L. E. A. ROWSON
The Royal Veterinary College, London

THE subject was a fourth calver shorthorn cow in fair condition.

History:

The owner had noticed that about 14 days before she was due to calve she had gone off her food and appeared dull and disinclined to move about. He had not attributed any special significance to this as the cow got no worse, but on the other hand, she did not show any improvement. Ten days later she began to show symptoms of commencing parturition and had to be aided by the owner in the delivery of a dead calf. The size of the cow and the fact that she had previously had twins prompted the owner to make a thorough examination for a second calf but none could be felt.. This was on the Wednesday and by Thursday night when the owner asked me to see the animal she was obviously going to die unless aid was forthcoming.

The cow was lying on her near side and after turning her over one could apparently detect a second calf by ballottement. One expected uterine inertia after the prolonged straining during the delivery of the first calf, the animal's inability to deliver the second being either due to inertia or to obstructive dystocia or both.

On vaginal examination, however, no calf could be detected and careful examination failed to reveal any tear in the uterine wall. One began to wonder if the object palpated externally actually was a calf or a pathological condition.

The cow was then turned over and an assistant attempted to raise the abdomen upwards in an effort to lift the "object" but it still could not be palpated. As the cow was obviously going to die, the owner was advised to send for the knackerman, but unfortunately he was not available and the cow died the following day before he arrived.

Post-mortem:

On opening the animal the "object" proved to be the second calf and it was found to be completely entangled in the viscera. The uterine horn had ruptured at its most distal point and all but the head and terminal part of the forelimbs of the calf had prolapsed into the peritoneal cavity.

Strong adhesions had formed between the viscera and calf and it was only extricated with difficulty.

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The question arises as to when the rupture occurred. Did it occur when the owner noticed the cow to be falling off (e.g., ten days before the first parturition) or did it occur during the birth of the first calf? The extent of the adhesions would suggest the former and in such a case it would only be possible to guess at the etiology of the rupture although the twin factor would be a mechanical predisposition.

Abstracts

A NEW RESPIRATION INTERCEPTOR

By Dr. H. RUBLI
Zürich

Schweizer Archiv. f. Tierheilkude, June, 1938

In the examination of herds for tuberculosis our attention is chiefly called to the lungs as being the most frequent and earliest organs affected. For better auscultation stronger sounds are produced by various aids. A louder respiration is certainly, and without trouble, repeatedly produced by P. Schneider's respiratory interceptor.

The interceptor consists of a special halter and a pliable indiarubber sheet on a metal framework. This is fastened to the laryngeal part of the halter and can easily be stretched over the nasal openings and completely close the same. The metal framework is held to the nose strap of the halter by hooks. A piece of canvas is sewn on the nose strap for better fixing (all metal parts are so constructed that injuries are not possible). If the animal shows distress at the obstruction to breathing the metal framework can be loosened from the hooks by a simple movement of the hand and the halter hangs down. The interception can be repeated several times without the animal being much upset. The interceptor is also useful for the examination for foreign bodies.

It may be used for yearlings or adult cattle.

Disinfection of the apparatus is quite simple. With each interceptor an additional indiarubber sheet is given.

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Personal

CONGRATULATIONS to Mr. H. E. Hornby, Director of Veterinary Services in Tanganyika, who has been appointed Director of Tsetse Research in succession to the late Mr. C. F. M. Swynnerton.

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All communications should be addressed to 7 and 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Temple Bar 8568. Telegrams: "Baillière Phone, London."

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